

Western Kentucky University
TopSCHOLAR®

Masters Theses & Specialist Projects

Graduate School

8-2014

Objective Measures and Insight Assessments of Muscle Dysmorphia

Austin Blake Lowe

Western Kentucky University, austin.lowe420@topper.wku.edu

Follow this and additional works at: <http://digitalcommons.wku.edu/theses>



Part of the [Clinical Psychology Commons](#), and the [Health Psychology Commons](#)

Recommended Citation

Lowe, Austin Blake, "Objective Measures and Insight Assessments of Muscle Dysmorphia" (2014). *Masters Theses & Specialist Projects*. Paper 1397.

<http://digitalcommons.wku.edu/theses/1397>

This Thesis is brought to you for free and open access by TopSCHOLAR®. It has been accepted for inclusion in Masters Theses & Specialist Projects by an authorized administrator of TopSCHOLAR®. For more information, please contact connie.foster@wku.edu.

OBJECTIVE MEASURES AND INSIGHT ASSESSMENTS OF
MUSCLE DYSMORPHIA

A Thesis
Presented to
The Faculty of the Department of Psychology
Western Kentucky University
Bowling Green, Kentucky

In Partial Fulfillment
of The Requirements for the Degree
Master of Arts

By
Austin Blake Lowe

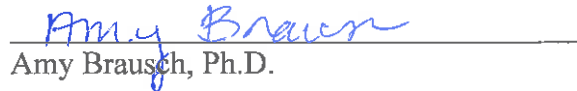
August 2014

OBJECTIVE MEASURES AND INSIGHT ASSESSMENTS OF
MUSCLE DYSMORPHIA

Date Recommended 7-21-14



Frederick Grieve, Ph.D. Director of Thesis



Amy Brausch, Ph.D.



Aaron Wichman, Ph.D.


Dean, Graduate School

8-7-14
Date

ACKNOWLEDGEMENTS

I would like to thank and acknowledge Dr. Rick Grieve for the time, assistance, and work that he has committed to helping me complete this thesis. Not only has he taught me how to improve my skills in a clinical setting, he has assisted me in conducting research, providing articles and the support necessary to complete the requirement for my degree. I would also like to thank the other members of my Dr. Amy Brausch and Dr. Aaron Wichman. I am thankful that both of you have taken the time to review, comment, and support my research ideas; your help is greatly appreciated.

I would also like to thank my family for all of the love and support that they have given me throughout this entire process. I would especially like to thank my parents for the sacrifices that they have made raising me and the morals that they have instilled in me. I would also like to thank the friends that I have made while attending Western Kentucky University as well as those that I have known prior to attending. You have all offered words of encouragement and support through my struggles and for that I am extremely grateful. I love all of you and God bless.

TABLE OF CONTENTS

List of Tables.....	vi
Abstract.....	vii
Introduction.....	1
Criteria for Muscle Dysmorphia.....	2
Prevalence of Muscle Dysmorphia.....	3
Disorders Comorbid with Muscle Dysmorphia.....	6
Steroid and Drug Abuse.....	8
Perspectives on Muscle Dysmorphia.....	10
Additional Motives for Exercise.....	13
Athletic Identity.....	16
Present Study.....	19
Method.....	21
Participants and Design.....	21
Measures.....	22
Demographics.....	22
Obligatory Exercise Questionnaire.....	23
Exercise Motivations Inventory-2 nd edition.....	23
Reasons for Exercise Inventory.....	23
Athletic Identity Measurement Scale.....	24
Muscle Dysmorphia Questionnaire.....	24
Symptom Insight Assessment.....	25
Criteria Awareness Assessment.....	25

Procedure.....	25
Results.....	27
Preliminary Analyses.....	27
Hypothesis Testing.....	29
Discussion.....	33
Appendix A-Demographics Survey.....	38
Appendix B-Obligatory Exercise Questionnaire.....	39
Appendix C-Exercise Motivations Inventory-2 nd edition.....	42
Appendix D-Reasons for Exercise Inventory.....	45
Appendix E-Athletic Identity Measurement Scale.....	46
Appendix F-Muscle Dysmorphia Questionnaire.....	47
Appendix G-Symptom Insight Assessment.....	50
Appendix H-Criteria Awareness Assessment.....	51
Appendix I-Cover Letter-Informed Consent.....	54
Appendix J-Debriefing Form.....	55
Appendix K-IRB Approval Form.....	56
References.....	58

LIST OF TABLES

Table 1: Descriptive Statistics	27
Table 2: Correlation between REI and EMI subscales.....	28
Table 3: Regression between Variables.....	30
Table 4: Regression between Variables for Sports Participation.....	31
Table 5: Regression between Variables for No Sports Participation.....	32

OBJECTIVE MEASURES AND INSIGHT ASSESSMENTS OF MUSCLE DYSMORPHIA

Austin Lowe

August 2014

Pages 64

Directed by: Frederick Grieve, Amy Brausch, Aaron Wichman

Department of Psychology

Western Kentucky University

Muscle dysmorphia is a relatively new psychological disorder primarily affecting males who engage in weightlifting or bodybuilding. Individuals with this disorder are obsessed with the idea that their body is not sufficiently lean or muscular when compared to others and engage in several, risky behaviors (i.e., frequent exercise sessions, anabolic steroid use, structured diets) to increase muscularity. As obtaining and maintaining a muscular physique is so important to his or her self-worth, an individual may have little insight to how their behaviors are affecting their social and occupational lives and are reluctant to seek out psychological treatment. The purpose of this study was to assess obligation to exercise, motivation and reason to exercise, athletic identity, and behaviors of muscle dysmorphia and examine their relationship to insight and recognition of criteria for muscle dysmorphia through correlation and regression tests. Participants ($N = 85$) completed a series of questionnaires to assess the independent variables and were then administered two questionnaires designed for the study to assess insight to any criteria participants might be experiencing and recognition of criteria in a case vignette also designed for the study. Analyses of results showed that participants with a higher athletic identity and more behaviors of muscle dysmorphia had a higher level of insight than participants with low athletic identity and fewer behaviors of muscle dysmorphia; on the other hand, individuals with more behaviors of muscle dysmorphia had a lower recognition of criteria of muscle dysmorphia than those with fewer behaviors. These

findings support the notion that individuals participating in athletics and exercises to enhance muscularity have varying levels of insight to their preoccupation with improving their body shape.

Introduction

Generally, psychological research addressing body image concerns has focused predominately on women (Olivardia, Pope, & Hudson, 2000). More recent studies have shown an increase in body image distortion among men (Grieve, Truba, & Bowersox, 2009; Olivardia, 2001). A study conducted by Grieve, Newton, Kelley, Miller, and Kerr (2005) administered the Body Shape Assessment to male and female participants. The assessment consists of nine drawings of male body physiques that are arranged from 1(*very thin*) to 9 (*very muscular*). After viewing the drawings, male participants were asked three questions: (1) which drawing best depicted their current image, (2) which one indicated what they would like to look like, and (3) which one they believed women would find most attractive; female participants were only asked which image they found most attractive. Statistical analyses revealed that the ideal body image for men was more muscular than their current image. Further analyses comparing the body shape men believed women would find most attractive with the body shape that women actually found more attractive showed that men thought women would find a more muscular body shape more attractive than what the women actually reported as most attractive.

As opposed to women who are driven to lose weight by concerns about being “too big,” men are more focused on gaining weight due to thoughts of being “too small.” In other words, men feel insecure about their bodies not being muscular enough. However, these men are more concerned about gaining muscle instead of fat (Olivardia, 2001). Originally termed “reverse anorexia,” researchers have labeled this condition muscle dysmorphia (Pope, Katz, & Hudson, 1993; Olivardia, Pope, & Hudson, 2000).

Muscle dysmorphia has been described as a preoccupation that one's body image is not sufficiently lean or muscular (Grieve, 2007; Olivardia, 2001). Individuals that develop this disorder display compulsive behaviors that include an excessive amount of time exercising, frequently inspecting their physiques in the mirror, and abusing substances as either a means to improve muscularity or to cope with feelings of inferiority (Olivardia, 2001). Despite the impairments these behaviors can cause, the majority of individuals who develop muscle dysmorphia do not consider their exercising to be a problem and are therefore reluctant to seek professional help. As the main sources of self-evaluation stem from social comparisons and media influences, it is likely that people with muscle dysmorphia consider such ideas to be a sign of weakness.

Criteria for Muscle Dysmorphia

Currently, muscle dysmorphia is classified as a specifier of body dysmorphic disorder in the *Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition (DSM-5; American Psychiatric Association, 2013), defined by a unique set of criteria outlined by Olivardia (2001). The key symptom of muscle dysmorphia is that an individual believes that his or her body is not as muscular as he or she wishes it would be, even though the individual is usually more muscular than the majority of others. These obsessions over body shape lead to severe impairments in several areas of functioning. Individuals frequently miss social or occupational functions because they are overly committed to their exercise routines. In one study, Olivardia (2001) noted several cases where men's devotion to increasing and maintaining muscularity led to serious implications; for example, Olivardia reported that one man was fired from his job as an attorney because he took excessively long lunch breaks to lift weights at the gym.

Additionally, individuals with muscle dysmorphia feel intense anxiety when their bodies are exposed in public and go to extreme lengths to avoid such situations (DSM-5, 2013). Even though they are distressed by others seeing their bodies, individuals with muscle dysmorphia frequently check their appearance in the mirror to look for any changes in physique. Finally, individuals with muscle dysmorphia follow thorough dietary guidelines that normally include a high protein intake and a low intake of carbohydrates and fats (Olivardia, 2001). They often ingest performance-enhancing substances, such as anabolic-androgenic steroids, despite the risk to their health (Olivardia, 2001).

One of the greatest concerns regarding muscle dysmorphia is that, even though individuals may be concerned about the effects their behavior is having on their overall functioning, their fear of getting smaller is greater than their desire to change their behavior (Olivardia, 2001). They do not consider therapy necessary for improving their life and skip sessions with their therapists because the sessions conflict with their scheduled gym times. Even when individuals do seek out treatment, it is often for depression, anxiety, or steroid abuse and it is normally at the request of their family members (Olivardia, 2001). Despite these findings, little research has been done to assess what factors contribute to an individual seeking out treatment without encouragement from others.

Prevalence of Muscle Dysmorphia

Despite the growing awareness of muscle dysmorphia and body image concerns among males, the only information regarding prevalence of muscle dysmorphia is limited to specific populations; additionally, said studies have noted that individuals with more

severe symptoms may not participate in studies out of fear of reporting any symptoms (Olivardia, 2001). However, usual estimates proposed by studies are that 5-10% of weightlifters and 9% of men diagnosed with body dysmorphic disorder have muscle dysmorphia (Cafri et al., 2005; Olivardia, 2001); the mean age of onset for symptoms is 19.4 years (Olivardia et al., 2000). However, the limitations of these estimates are that the samples have been restricted to college students.

Some research has been conducted to address muscle dysmorphia and body image concerns among gay males; results however have been conflicting. Although some studies have shown that gay males have a greater level of body dissatisfaction than heterosexual males, other studies have found no difference in body image satisfaction, perception, and drive for muscularity (Chaney, 2008). Olivardia, Pope, and Hudson (2000) interviewed 24 men with muscle dysmorphia for comparison with 30 normal weightlifters. Five of the men with muscle dysmorphia (21%) and five of the normal weightlifters (17%) reported their sexual orientation as homosexual. Interviews from each group showed no significant differences in sexual behavior, age of first sexual intercourse, or frequency of sexual activities per year.

Another study conducted by Chaney (2008) examined the relationship among low-self-esteem, loneliness, and muscle dysmorphia in gay and bisexual males. A total of 314 participants were administered the Muscle Appearance Satisfaction Scale (Mayville, Williamson, White, Netemeyer, & Drab, 2002) and then a self-esteem and loneliness measure. Muscle dysmorphia was negatively correlated with self-esteem and positively correlated with loneliness. However, the findings did not show whether low self-esteem or greater feelings of loneliness lead to muscle dysmorphia (Chaney, 2008).

Although there is currently an increasing number of female bodybuilders, there have been few studies conducted to look at the prevalence of muscle dysmorphia in females. It has often been thought that, because a greater number of women report trying to lose weight as opposed to gain weight, they are less concerned with improving muscularity; the main explanation for this is that the ideal body shape for women is normally thin and small (Jonason, 2007). A study conducted by Jonason compared sex differences in behavior. Results showed that men were more concerned with developing their upper body than women, women were more focused with developing their lower body and weight loss than men, and both genders reported spending a similar amount of time working out their abdominal areas (Jonason, 2007).

In a study performed by Pope, Gruber, Choi, Olivardia, and Phillips (1997), 38 female bodybuilders were administered a clinical interview and also assessed to gather information regarding psychiatric and medical history. There were thirty-two (84%) participants that reported being preoccupied with being lean and muscular to the point that they had sacrificed social and occupational responsibilities; twelve participants (38%) reported previously using anabolic steroids; and all of the female participants reported using drugs for weight loss. Although insight into the disorder was not assessed for all females participating, one participant was described as having poor insight about her behavior for ignoring the negative health effects.

Other studies have been conducted to determine if there are differences between genders in drive for muscularity. In a study by Kyreito, Mosewich, Kowalski, Mack, & Crocker (2008), 71 males and 126 females were administered a series of questionnaires to examine whether differences on drive for muscularity were present when the goal was to

improve muscle tone instead of size. Results showed that when asked about gaining muscle “tone” instead of muscle “mass,” there were no gender differences in drive for muscularity (Kyrejtó et al., 2008).

Disorders Comorbid with Muscle Dysmorphia

Even though muscle dysmorphia is currently classified as a subtype of body dysmorphic disorder, there are arguments that muscle dysmorphia is better suited to being classified as a subtype of obsessive-compulsive disorder or an eating disorder (Grieve, 2007; Nieuwoudt, Zhou, Coutts, & Booker, 2012). Obsessive-compulsive disorder and muscle dysmorphia are both characterized by obsessions and compulsions that cause severe impairment in life. Whereas obsessive-compulsive disorder can be characterized by obsessions with cleanliness or hoarding, individuals with muscle dysmorphia are obsessed with obtaining muscularity and leanness and feel compelled to achieve this level by excessive weightlifting or cardio exercise.

A study conducted by Chandler, Derryberry, Grieve, and Pegg (2009), examined the relationship symptoms of anxiety (obsessive-compulsive symptoms, trait anxiety, social physique anxiety, drive for muscularity, and media influences) have with muscle dysmorphia. Participants were 97 male college students; in an initial demographics assessment, 44 (50.6%) had a gym membership; 64 (73.6%) participated in cardiovascular exercise; 32 (36.8) reporting using supplements while working out (i.e., creatine, protein, or vitamins); 6 (6.9%) admitted to using topical pain relievers before their workouts and 12 (13.8%) reported using them after workouts; 12 (13.8%) reported taking oral pain relievers before workouts while (24.1%) reported using them after working out.

Participants were administered a series of questionnaires to measure state and trait-based anxiety, body anxiety, symptoms of obsessive-compulsive disorder, symptoms of muscle dysmorphia, drive for muscularity, and body focus. An analysis of results showed a strong relationship between trait anxiety, social physique anxiety, obsessive-compulsive features, and muscle dysmorphia symptoms. Obsessive-compulsive features were strongly correlated and highly predictive of social anxiety and overall muscle dysmorphia symptoms.

In the case of eating disorders, individuals with muscle dysmorphia report several symptoms similar to anorexia nervosa. Both disorders are comprised of body image distortions, compulsions to reach and maintain a certain body shape, and irregular eating habits (Grieve et al., 2009). By comparing responses on the Eating Disorders Inventory, Olivardia et al. (2000) found that subjects with muscle dysmorphia reported significantly greater pathology than 30 normal weightlifters. However, the difference between muscle dysmorphia and anorexia nervosa is in the goal that individuals are pursuing. Individuals with anorexia nervosa are driven to attain thinness while individuals with muscle dysmorphia are driven to achieve muscularity.

In a study conducted by Pope, Katz, and Hudson (1993), 55 bodybuilders with confirmed steroid use and 53 control subjects were administered structured interviews to examine the effects of anabolic steroids. An examination of participants' responses revealed that three of the experimental subjects reported a history of anorexia nervosa and nine experimental subjects (two of whom had a history of anorexia nervosa) reported symptoms of muscle dysmorphia. All of the men with muscle dysmorphia admitted to avoiding social events, refusing to expose parts of their body, and wearing heavy clothing

throughout the year. Further, all of the participants with muscle dysmorphia reported taking steroids, with four stating that their symptoms were a factor in their decision to take steroids; no symptoms of muscle dysmorphia were reported among the control subjects. The researchers concluded that weightlifters are more likely to develop anorexia nervosa and muscle dysmorphia and that muscle dysmorphia is likely to precipitate steroid use.

Steroid and Drug Abuse

Individuals with muscle dysmorphia are more likely to abuse performance-enhancing substances than average bodybuilders, even though they are aware of the potential adverse effects (Olivardia, 2001). In a case study by Mosley (2009), the subject used three cycles of steroids within the previous year; when asked his opinion on steroid use, he reported that he did not view it as any different from men living sedentary lifestyles or consuming unhealthy diets. Further, the subject stated that, even though he was aware of the long-term effects of steroid use, he was more concerned with his current physical state than the negative physical and psychological effects.

Cafri et al. (2005) note that close to one million males are estimated to have a lifetime prevalence of steroid use. Because of the associated risks, as well as the high prevalence rate, steroid use is considered one of the most serious problems in the U.S. Although the physical benefits of using anabolic-androgenic steroids (AAS) are well-known (i.e., increases in strength, muscle size, and fat-free mass, as well as a reduction in body fat), some of the adverse physical effects are disputed. Even though researchers have found a link between steroid usage and physical side effects, including jaundice,

hypertension, pulmonary embolism, acne, and gynecomastia (Cafri et al., 2005), there are lower frequencies of occurrence for other adverse effects, such as stroke, heart attack, and cardiomyopathy, because of a lower prevalence of steroid use among patients reporting said symptoms.

Additionally, AAS users frequently exhibit several severe psychological effects; reported effects include paranoia, mood changes, psychotic episodes, aggression, depression, and increased hostility (Cafri et al., 2005). Adolescents, in particular, are at risk of developing a dependence on steroids that can lead to impairments in academic achievement and psychosocial development and polydrug use. Despite these risks, individuals are reluctant to cease taking these drugs out of fear that they will lose their muscular appearance (Grieve et al., 2009) or experience the possible effects of withdrawal. Cafri et al. (2005) note that severe depression and suicidal ideation have been reported in cases where extreme, long-term users went through withdrawal.

People with muscle dysmorphia are at an increased risk of using legal and illegal performance-enhancing substances as compared to other individuals who work out (Grieve et al., 2009). Olivardia et al. (2000) conducted a study comparing 24 men with a diagnosis of muscle dysmorphia to 30 non-dysmorphic weightlifters. By assessing responses to questions regarding history of steroid use, the researchers found a significant difference between the two groups; 11 of the 24 men with muscle dysmorphia reported using steroids, in comparison to only two of the control group. However, these results should be interpreted with caution, as participants may have withheld relevant information; one participant denied steroid abuse, but his physiological measures indicated otherwise (Olivardia et al., 2000).

Currently, research examining whether there is any change in symptoms of muscle dysmorphia if an individual ceases using steroids is limited. Davies, Smith, and Collier (2011) compared the prevalence of muscle dysmorphia in 30 current and 30 former steroid users. After completing a demographics form, participants were administered the Muscle Dysmorphia Inventory (MDI; Rhea, Lantz, & Cornelius, 2004) to assess behavioral and psychological characteristics of muscle dysmorphia. Afterwards, nine participants consented to be interviewed (four former and five current AAS users) in order to clarify experiences of muscle dysmorphia among the two groups. Even though former steroid users scored higher on five of the MDI subscales (nutrition, supplement use, exercise dependence, physique protection, and body size/symmetry), statistical analyses revealed no significant differences between former and current AAS users based on experience of the muscle dysmorphia symptoms (Davies et al., 2011).

Perspectives on Muscle Dysmorphia

The most widely researched model regarding the underlying factors leading to the development of muscle dysmorphia is a biopsychosocial model. A conceptual model described by Grieve (2007) revealed four categories of variables, each with contributing factors, within this model that have been shown to be related to muscle dysmorphia. These categories are socioenvironmental, emotional, psychological, and physiological factors; however, the socioenvironmental factors have been shown to be the most influential. These factors convey muscular ideals through an individual's social environment, such as family, peers, athletics, and mass media. For example, individuals who participate in sports, particularly those that require higher muscle mass, are at an increased risk for developing muscle dysmorphia. They are already encouraged to engage

in weightlifting to increase muscularity, compete against others, and maintain strict schedules. Furthermore, because of limited training time, athletes often resort to using anabolic steroids to achieve the desired body shape (Grieve, 2007).

However, mass media has been regarded as the most influential of all pressures (Grieve, 2007). Mass media, predominately in Western societies, promotes individuals with physiques that seem impossible to attain (Baghurst & Kissinger, 2009). Studies have shown that media presentations of the male body (i.e., magazine models, action toys, and celebrities) influence body image ideals through contrast effects (Grieve, 2007). Even though social comparison theory has been shown to help others by increasing self-esteem through contrasting with others considered to be of lower status (Dijkstra, Gibbons, & Buunk, 2010), the opposite effect has been shown to result from contrasting with individuals with a perceived higher status. In the case of muscle dysmorphia, comparing oneself to overly muscular individuals can decrease self-esteem. In an experiment done by Leit, Gray, and Pope (2001), participants were shown 10 advertisements that did not focus on body image and 20 advertisements that featured an ideal male body image; a control group was shown 30 slides that either contained no human images or human images that did not focus on the body (Leit et al., 2001). After viewing the images, participants were instructed to use a computer program to adjust pictures of males to make them more or less muscular and to select the image that participants believed represented their current body shape, their ideal body shape, the average body shape of someone their age, and the body shape they believed women most desired. Results showed that participants that viewed the muscular images had a significantly greater discrepancy between their current and ideal shape and between their current and

estimated of average man's body shape than the control group; however, there was no significant difference between the two groups on the difference between their current body shape and the body shape they believed most desired by women.

In another study, Baird and Grieve (2006) examined the effects of exposure to male models in advertisements on body satisfaction in 173 college males. Participants completed the body assessment survey (BAS) to assess their initial attitudes toward their various parts of their body. After completing the survey, participants were randomly assigned to one of two groups: (1) an experimental condition that was shown eight clothing or cologne advertisements including male models or (2) a control group that saw advertisements only featuring the products. Participants viewed each advertisement for 30 seconds and responded to five statements about each advertisement. Participants were re-administered the BAS after responding to all statements about each advertisement. Even though results showed no significant main effect for the type of picture participants viewed, there was a significant interaction between the type of picture and time. Participants in the experimental condition showed an increase in body dissatisfaction, while there was no change in body dissatisfaction for the control group.

A similar study was conducted by Lorenzen, Grieve, and Thomas (2004), where participants completed the BAS prior to and after viewing either six images of muscular or average-sized men; participants were allowed to regulate how long they viewed each image before proceeding to the next. Participants rated each image on six dimensions (attractiveness, muscularity, likeability, and how smart, friendly, and healthy they seemed) on a seven-point Likert scale ranging from 1 (*not at all*) to 7 (*extremely*). There was no significant main effect for time spent viewing each image or image type, but there

was a significant interaction for image type and the time spent viewing the image. Scores on the BAS showed that body satisfaction decreased in the experimental group after they were exposed to the muscular male images, while scores remained constant for the control group after exposure to the images with average muscularity.

Additional Motives for Exercise

In addition for improving muscularity, several other motivations have been identified as factors in what specific exercises individuals complete, how often and how long they exercise. In an effort to gain a greater understanding of motivations for exercising, Self-Determination Theory (SDT; Deci & Ryan, 1985) has been suggested as a means of exploring motivations (Duncan, Hall, Wilson, & Jenny, 2010). Self-Determination Theory proposes that motivations for exercising can be broken down into two categories: intrinsic and extrinsic. Intrinsic motivations are focused on personal interests, with specific motivations being enjoyment, improving abilities, or social affiliation. On the other hand, extrinsic motivations are concerned with achievement or recognition, and include weight loss or appearance (Markland & Ingledew, 1997).

Further research into motivations for exercise has found that there are differences in motivation based on gender. In a study conducted by Kilpatrick, Hebert, and Bartholomew (2005), male and female college students were administered the Exercise Motivations Inventory-2 (EMI-2; Markland & Ingledew, 1997) to distinguish differences in extrinsic and intrinsic motivations between genders. An analysis of the results revealed that men were more motivated than women for competition, challenge, social

recognition, and strength and endurance; weight management was the only motive that women rated higher than men (Kilpatrick et al., 2005).

In another study, Jonason (2007) assessed differences between men and women in exercise motivations and behaviors. To do so, Jonason created six measures, each designed to assess the amount of time participants spent exercising three specific muscle groups (upper body, lower body, and abdominal) and the amount of time they committed to a specific motivation (muscle gain, toning, and weight loss); information was collected using a five-point Likert scale ranging from 1 (*not at all*) to 5 (*very much*).

Corresponding to Jonason's hypotheses, an analysis of the results showed that (1) men spent more time working out their upper body than women, (2) women spent more time working out their lower body than men, (3) but no significant differences were found in time spent working out abdominal muscles based on gender. Additionally, there were significant gender differences found for exercise motivation. Men reported spending more time trying to build muscle and a greater concern with muscle tone than women, and women reported spending more time trying to lose weight than men.

It should be noted that exercising should be distinguished from sport and athletic participation. Although both are classified as forms of physical activity, there are benefits and motivations related to athletic involvement beyond the physiological aspects of just exercising (Kilpatrick, Bartholomew, & Riemer, 2003). Exercise has normally been defined as participating in physical activity to gain or maintain fitness; on the other hand, sport is defined as engaging in physical activity for recreational purposes. Individuals participating in sport derive benefits such as higher self-esteem, more positive body image, greater social development, and greater social status than non-participating

individuals (Cafri et al., 2005). Furthermore, individuals participating in athletics often develop skills that carry over into their personal lives, such as abstaining from alcohol and illicit drugs, accepting and overcoming failures and difficult situations, as well as having a wider range of educational and career opportunities.

To compare the differences in exercise behaviors and motivations between engaging in exercise and engaging in sports, Kilpatrick, Hebert, and Bartholomew (2005) sampled 233 college students by collecting demographic information about physical activity (frequency, duration, intensity, and adherence) and then administered two modified versions of the Exercise Motivations Inventory – 2nd edition (EMI-2); each version was specifically modified by the researchers to clearly define the activity participants engaged in with one referencing physical activity as “exercise” and the other referencing physical activities as “sport.” An analysis of the results showed that participants engaged in exercise more frequently and at a higher intensity than they did in sports, but there were no significant differences in ratings of duration or adherence to activity. Additionally, analyses revealed a mix of intrinsic and extrinsic motivations for each form of physical activity; participants were more motivated by appearance, strength and endurance, stress management, health pressures, ill-health avoidance, and positive health when they engaged in exercise, but rated affiliation, challenge, competition, enjoyment, and social recognition as higher motivations for sport participation (Kilpatrick et al., 2005).

Despite the positive aspects of sport participation, there are associated negative features as well. Even though the majority of college athletic programs require student-athletes to maintain a certain grade point average (GPA), studies have shown that

student-athletes do not have a higher GPA or motivation for learning than students who are not athletes; in fact, data support the notion that sport participation has a negative to no association with academic efforts (Chen, Snyder, & Magner, 2010). Additional problems associated with sport participation include violent behavior, substance abuse, eating disorders, depression, gambling, and lack of social involvement beyond athletic related pursuits.

Certain risks related to sport participation have been shown to be increased when a sport requires individuals to obtain a specific body shape and weight. In sports such as bodybuilding and football, athletes with greater muscle mass and body size are valued above more average looking players, inciting players to go to greater lengths to improve muscularity, and therefore running the risk of developing steroid abuse or muscle dysmorphia (Grieve, 2009). On the contrary, sports that have certain weight restrictions such as wrestling, boxing, swimming, or gymnastics, inspire participants to avoid gaining weight in an effort to stay lean; as a result, these individuals have a high risk of eating disorders or abuse of diuretics and laxatives (Cafri et al., 2005; Grieve et al., 2009).

Athletic Identity

Another potential factor in assessing why individuals exercise can be tied to their self-concept. Self-concept is defined as the mental perception an individual has of him or herself (Fournier, 2010). Several studies have shown that self-concept is comprised of several different aspects, each of which has different levels of skill and personal worth to an individual (Brewer, Van Raalte, & Linder, 1993). The aspects that an individual places more worth on are often responsible for organizing and interpreting information based on

how an aspect relates to that specific concept. The main idea regarding how an individual determines the worth of a specific aspect is the individual's personal level of competence. For example, a student with high achievement in academics is more likely to be affected by a poor grade than someone with lower achievement.

Athletic identity is defined as the degree to which an individual considers him-or herself an athlete (Chen et al., 2010). Athletic identity has been found to correlate with: (1) athletic appearance; (2) importance of exercise, sports, and physical activity; (3) competence; (4) encouragement from others to be an athlete. There have been many benefits found to be associated with higher degrees of athletic identity, several of which have been previously mentioned as benefits of sport participation (Brewer et al., 1993). First of all, individuals with a strong commitment to athletics have an improved sense of self, social life, and higher levels of confidence. Second, a strong athletic identity can improve athletic performance by providing an individual to with a more focused approach to training. Finally, individuals who strongly identify themselves as athletes exercise more frequently and engage in more exercise behaviors than those with lower athletic identities.

However, certain costs have been identified with a stronger athletic identity. First, individuals with a strong athletic identity run the risk of neglecting areas of their life unrelated to athletics, such as other extracurricular activities or friendships. Also, because they often lack other sources of self-worth, individuals with a high sense of athletic identity are more vulnerable to depression when faced with role-disrupting life events (Brewer, 1993). For example, after sustaining an injury, individuals with a high degree of

athletic identity are likely to interpret it as inhibiting their ability to exercise or participate in competitions; this in turn decreases mood and self-esteem (Brewer et al., 1993).

Brewer (1993) conducted four studies to examine how vulnerable to depression individuals were, based on their identification with the athletic role, after experiencing a disrupting life event, specifically an athletic injury. In Study 1, participants were randomly assigned to an experimental imagery condition or a control group. All participants completed the Athletic Identity Measurement Scale (AIMS; Brewer et al., 1993) at the beginning of the study to measure their athletic identity. The imagery group was instructed to sit in a comfortable position and then imagine sustaining an injury that would end their athletic career. After imagining the scenario, participants completed the Depression scale from the Profile of Mood States (POMS-D; McNair, Lorr, & Droppleman, 1971) to assess depressed mood; the control condition completed the AIMS without receiving the imagery instructions. An analysis of the results showed that depression was related to athletic identity for the experimental group, but negatively related to athletic identity for the control group.

In Study 2, the AIMS and POMS-D were used for the same purposes as in Study 1; however, in this study, participants were randomly assigned to an injury group or a course failure group. After first completing the AIMS, participants in the injury group were instructed to complete the POMS-D in a way that would describe how they would feel if they suffered an injury that ended their athletic career; the course failure participants were instructed to complete the POMS-D in a way that would describe how they would feel if they failed an academic course related to their college major. An analysis of the results showed that the course failure group had higher POMS-D scores

than the injury participants; however, only some of the participants in the injury group were athletes. Therefore, these results should be interpreted with caution.

Study 3 recruited injured athletes from a sport medicine clinic to assess the degree that athletic identity was related to depressed mood after being injured. Again, participants completed the AIMS to measure athletic identity. Participants then completed the Physical Self-Perception Profile global physical self-worth subscale (Fox & Corbin, 1989) to measure physical self-efficacy and the Social and Athletic Readjustment Rating Scale (Holmes & Rahe, 1967) to measure stressful life events that were specifically related to sports; the Beck Depression Inventory (BDI; Beck, 1967) and POMS-D were used to measure depression. Again, athletic identity was positively associated with measures of depressed mood.

Study 4 recruited 90 members of the University of California varsity football team several weeks before the first game. Participants were divided into two groups based on whether they admitted to being injured or not; 15 players were assigned to the injured group and 75 players were assigned to the uninjured group. All players completed the questionnaires that were used in Study 3. An analysis of the results showed that athletic identity was positively related to depression for the injured participants and was negatively related to the uninjured participants.

Present Study

The purpose of the current study was to collect and examine information about patterns and motivations for participants' exercising and then examine their awareness for any personal evidence of muscle dysmorphia. Hypothesis 1 predicted that participants

who score high on the exercise questionnaires and Muscle Dysmorphia Questionnaire will have low rates of admitting that they themselves meet any of the criteria for muscle dysmorphia. Hypothesis 2 predicted that participants who score high on the exercise questionnaires and Muscle Dysmorphia Questionnaire will have but high rates of identifying the criteria of muscle dysmorphia in a described patient.

Method

Participants and Design

Participants for the study were 86 men all over the age of 18 who were recruited via three methods. Eighteen participants were students attending Western Kentucky University (WKU) and were recruited through the Department of Psychology Study Board; these students received course credit or extra credit for participation at the discretion of their instructors. Fifty-eight participants were recruited through the Amazon Mechanical Turk website and were awarded a monetary payment upon completion; originally these participants were awarded \$0.20 for their participation. However, the payment was increased to \$0.50 in an effort to increase the number of participants. The final nine participants were volunteers that were either graduate students or personal acquaintances that had no insight to the purpose of the study. Because of the lack of control in using workers from Amazon Mechanical Turk, five manipulation check questions were spread throughout the survey to ensure that participants were responding to questions in a consistent manner. Although participants were excluded from the data set if they missed even one manipulation check question, the Amazon Mechanical Turk participants were only denied payment if they missed more than three manipulation check questions.

The mean age of participants was 32.73 ($SD = 13.42$), with ages ranging from 18 to 65. Participants were comprised of eight high school graduates, 12 freshmen in college, nine sophomores, six juniors, 19 seniors, 13 graduate students, and 17 college graduates; as the specifics on which semester or what year the graduate students were in

was not assessed, mean education level for participants was not calculated. Participants included 58 (68.2%) Caucasians, 17 (20.0%) Asians, 5 (5.9%) African Americans, 2 (2.4%) American Indian/Alaskan Natives, 2 (2.4%) participants who did not indicate their race/ethnicity, and 1 (1.2%) Hispanic.

Body mass index (BMI) was calculated for participants by using their reported height and weight. The mean height of participants was 70.24 inches ($SD = 3.51$), with heights ranging from 60 to 76 inches. The mean weight of participants was 184.47 pounds ($SD = 45.26$), ranging from 70 to 310 pounds. The mean BMI of participants was 26.17 ($SD = 5.73$), ranging from 11.30 to 44.09

Of the 85 participants, 39 reported currently participating in one or more sports; because we allowed participants to enter the sports that they participated in, there was an extensive range of reported sports. Specifically, the types of sport listed included basketball, football, soccer, golf, cross fit, tae kwon do, cheerleading, tennis/badminton, powerlifting, weightlifting, cricket, volleyball, Frisbee, hockey, boxing, cycling, chess, table tennis, track/running, baseball/softball, racing, swimming, skipping rope, street biking, hiking, dodge ball, dance, fishing, and bowling.

Measures

Demographics. The participants in this study were asked to provide demographic information. Such information included their age, race or ethnicity, education level, any current sport participation, what specific sport participants engage in, height, and weight. Age, specific sport participation, height, and weight were blanks to fill in, but the other items had options to circle/select. See Appendix A.

Obligatory Exercise Questionnaire. This measure (OEQ; Pasman & Thompson, 1988) was used to assess fixation, frequency, and commitment to exercising. The OEQ is comprised of 20 questions designed to gather information on individual attitudes and habits in exercise, with participants responding from 1 (*never*) to 4 (*always*). An example question on the OEQ is “If I miss a planned workout, I attempt to make up for it the next day.” The OEQ was scored by summing the responses for each question (reverse scoring questions 8 and 10). The OEQ was chosen because of its excellent internal consistency ($\alpha = .96$; Pasman & Thompson, 1988). See Appendix B.

Exercise Motivations Inventory - 2. This measure (EMI-2; Markland & Ingledew, 1997) was used to determine overall motivation behind exercise participation. The EMI-2 contains a total of 51 questions that are designed to assess fitness and health-related reasons for exercising among exercisers and non-exercisers; for this study, participants responded to each reason on a scale from 1 (*Not at all true for me*) to 5 (*Very true for me*). A sample motivation for exercising is “To stay slim.” For the purpose of this study, the EMI-2 total score was obtained by summing the scores of all items. The EMI-2 was chosen because it is applicable to exercisers and non-exercisers, as well as having an acceptable internal consistency across subscales, with Cronbach’s alpha ranging from .69 to .92 (Markland & Ingledew, 1997). These subscales are Stress Management, Revitalisation, Enjoyment, Challenge, Social Recognition, Affiliation, Competition, Health Pressures, Ill-Health Avoidance, Positive Health, Weight Management, Appearance, Strength & Endurance, and Nimbleness. See Appendix C.

Reasons for Exercise Inventory. This measure (REI; Silberstein, Striegel-Moore, Timko & Rodin, 1988) was used to gather further information about reasons people have

for exercising. The REI contains a total of 24 reasons for exercising and asks participants to rate how important each reason is, with responses ranging from 1 (*Not at All Important*) to 7 (*Extremely Important*). An example reason for exercising on the questionnaire is “To cope with stress, anxiety.” For the purpose of this study, the REI was scored by summing the total score of the respective items. The REI was chosen because it assesses participants’ reasons for *actually* exercising in contrast to reasons why they *should* exercise. Furthermore, the subscales have reported good internal consistency, averaging between .70 and .81 (Crawford & Eklund, 1994). These subscales are Weight Control, Attractiveness, Mood, Fitness, Health Concerns, Enjoyment, and Tone. See Appendix D.

Athletic Identity Measurement Scale. This measure (AIMS; Brewer & Cornelius, 2001) was used to measure participants’ athletic identity made up of three factors: exclusivity, social identity, and negative affectivity (Groff & Zabriskie, 2006). The AIMS is made up of seven questions with responses ranging from 1 (*Strongly Disagree*) to 7 (*Strongly Agree*). A sample question from this scale is “I spend more time thinking about sports than anything else.” The AIMS is scored by summing the scores. The AIMS was chosen because of a high internal consistency (coefficient alpha = .81; Brewer & Cornelius, 2001) and test-retest reliability ($r = .89, p < .01$; Brewer, 1993). See Appendix E.

Muscle Dysmorphia Questionnaire. This measure (MDQ; Grieve et al., 2012) was used to measure symptoms of muscle dysmorphia, as defined by Olivardia (2001). The MDQ is made up of 34 questions with responses ranging from 1 (*Strongly Disagree*) to 6 (*Strongly Agree*). A sample question from this inventory is “I am inclined to continue to

work out when I am sick.” The MDQ is scored by summing the scores (reverse scoring questions 12, 16, and 20). The MDQ was chosen because of a strong positive correlation with the Muscle Dysmorphia Inventory ($r = .81, p < .001$; Grieve et al., 2012) and high internal consistency ($\alpha = .86$; Grieve et al., 2012). See Appendix F.

Symptom Insight Assessment. Participants provided their responses regarding whether or not they believe that they personally meet any of the criteria for muscle dysmorphia. Participants responded to each criterion on a scale from 1 (*Not at all true for me*) to 6 (*Very true for me*). This measure was used to assess participant knowledge and awareness of any personal symptoms of muscle dysmorphia as well as insight to said symptoms. See Appendix H.

Criteria Awareness Assessment. Participants read a vignette describing an individual exhibiting each of the criteria of muscle dysmorphia. Participants were then asked to rate whether or not they believed the patient described met any of the criteria for muscle dysmorphia. Participants responded to each criterion on a scale from 1 (*Not at all true for Jim*) to 6 (*Very true for Jim*). This measure was used to assess identification of the symptoms of muscle dysmorphia. See Appendix G.

Procedure

Upon being recruited for the study, participants were redirected to an informed consent document that informed them about the confidentiality of their responses as well as the procedures, risks, and benefits of the study; participants were free to withdraw from the study at any time without consequence. After reviewing the informed consent document and agreeing to participate, participants completed the demographics

questionnaire. Participants then completed the OEQ, the EMI-2, the REI, the AIMS, and the MDQ in this order.

After completing the above questionnaires, participants were asked to rate themselves as to what degree they believe they fit any of the criteria for muscle dysmorphia. Next, participants read a case history of a patient exhibiting each of the criteria for muscle dysmorphia and were then instructed to indicate what degree they believed the described patient met each criterion. Upon completing the study, participants were debriefed (see Appendix J) and dismissed. Additionally, participants were provided with contact information for the experimenters if they had any questions about the study.

Results

Preliminary Analyses

The items from each of the questionnaires were summed to create a total score for each scale. Additionally, Cronbach's alpha was calculated for each of the scales to determine internal consistency (see Table 1); each scale was shown to have high internal consistency, with coefficients ranging from .81 to .96.

Table 1: Descriptive statistics

Variable	<i>M</i>	<i>SD</i>	Range	Alpha (α)
OEQ	45.95	10.52	26-76	.89
EMI-2	159.74	37.06	69-242	.96
REI	112.54	25.55	39-168	.92
AIMS	20.73	12.10	7-49	.94
MDQ	94.13	26.77	47-147	.92
SIA	14.44	6.64	6-30	.83
CAA	30.40	5.27	15-36	.81

Note. The above statistics were obtained for the following measures: Obligatory Exercise Questionnaire (OEQ); Exercise Motivations Inventory-2nd edition (EMI-2); Reasons for Exercise Inventory (REI); Athletic Identity Measurement Scale (AIMS); Muscle Dysmorphic Questionnaire (MDQ); Symptom Insight Assessment (SIA); Criteria Awareness Assessment (CAA).

Pearson correlation coefficients were calculated to examine the relationship between subscales from the EMI-2 and REI. Although an analysis of the coefficients revealed acceptable to strong positive correlations among related variables (i.e., the

correlation between the EMI-2's Weight Management subscale and the REI's Weight Control subscale was .820), there were some interesting findings. The Affiliation subscale on the EMI-2 showed a stronger correlation with the Enjoyment subscale on the REI ($r = .88$) than the EMI-2's Enjoyment subscale ($r = .60$). Conversely, the correlation between the EMI's Health Pressures subscale and the REI's Health Concerns subscale was extremely weak ($r = .12$) when compared to the Health Concerns correlation with the EMI's Ill-Health Avoidance ($r = .82$) and Positive Health ($r = .78$) subscales. See Table 2 for the correlation matrix.

Table 2: Correlation between subscales on the EMI-2 and REI

	REI Subscales						
	Weight Control	Attractiveness	Mood	Fitness	Health Concerns	Enjoyment	Tone
EMI Subscales							
Stress Management	.23*	.44**	.79**	.49**	.25*	.52**	.42**
Revitalisation	.21	.34**	.70**	.51**	.31**	.44**	.31**
Enjoyment	.22*	.42**	.70**	.56**	.26*	.60**	.38**
Challenge	.24*	.45**	.54**	.47**	.14	.62**	.49**
Social Recognition	.30**	.54**	.52**	.36**	.14	.66**	.55**

Table 2 (Cont.)

	Weight Control	Attractiveness	Mood	Fitness	Health Concerns	Enjoyment	Tone
Affiliation	.17	.34**	.38**	.26*	.05	.88**	.32**
Competition	.15	.31**	.35**	.29**	.04	.69**	.33**
Health Pressures	.19	.29**	.38**	.24*	.12	.35**	.29**
Ill-Health Avoidance	.33**	.18	.36**	.47**	.82**	-.04	.25*
Positive Health	.45**	.30**	.48**	.57**	.78**	.08	.38**
Weight Management	.82**	.43**	.43**	.38**	.31**	.10	.65**
Appearance	.55**	.79**	.61**	.65**	.40**	.31**	.70**
Strength & Endurance	.39**	.58**	.52**	.83**	.49**	.26*	.58**
Nimbleness	.29**	.35**	.51**	.71**	.44**	.28*	.34**

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed)

Note. The above statistics were obtained for subscales on the Exercise Motivations Inventory-2nd edition (EMI-2) and the Reasons for Exercise Inventory (REI).

Hypothesis Testing

A multiple regression was conducted to predict scores on the SIA and CAA from scores on the OEQ, EMI-2, REI, AIMS, and MDQ. Hypothesis 1 for the study proposed that high scores on the OEQ, EMI-2, REI, AIMS, and MDQ would reveal low scores on

the SIA. An examination of results showed that these variables statistically significantly predicted SIA scores, $F(5, 79) = 57.19, p < .005, R^2 = .78$. However, only the AIMS and MDQ added statistically significant to the prediction, $p < .05$. Hypothesis 2 for the study proposed that high scores on the OEQ, EMI-2, REI, AIMS, and MDQ would reveal high scores on the CAA. Although there was a weaker correlation, results indicated that the variables predicted CAA scores $F(5, 79) = 3.88, p < .005, R^2 = .20$. In this analysis, only the MDQ were significant predictors of insight, $p < .05$. See Table 3 for the full results.

Table 3: Regression between variables

	SIA				CAA			
Variable	<i>B</i>	<i>SE B</i>	β	<i>p</i>	<i>B</i>	<i>SE B</i>	β	<i>p</i>
OEQ	-.059	.049	-.093	.237	-.028	.075	-.055	.713
EMI-2	-.020	.021	-.111	.356	-.026	.033	-.186	.421
REI	.000	.026	.002	.987	.074	.039	.358	.062
AIMS	.128	.042	.232	.003	-.098	.064	-.226	.126
MDQ	.217	.016	.876	.000	-.055	.024	-.277	.025

Note. The above statistics were obtained for the following measures: Obligatory Exercise Questionnaire (OEQ); Exercise Motivations Inventory-2nd edition (EMI-2); Reasons for Exercise Inventory (REI); Athletic Identity Measurement Scale (AIMS); Muscle Dysmorphic Questionnaire (MDQ); Symptom Insight Assessment (SIA); Criteria Awareness Assessment (CAA).

A second set of regression analyses were run, but this time participants were split into one of two groups based on whether they answered ‘Yes’ or ‘No’ to participating in

any sports; 39 participants answered ‘Yes’ to participating in sports while 46 participants answered ‘No’ to any current sports participation. Regardless of sports participation, results were similar to the total sample analysis for the SIA; the independent variables statistically significantly predicted scores, but only the AIMS and MDQ added statistically significant to the prediction; ‘Yes’ group: $F(5, 33) = 19.25, p < .005, R^2 = .75$; ‘No’ group: $F(5, 40) = 33.68, p < .005, R^2 = .81$. However, neither group’s scores on the independent variables were statistically significant in predicting CAA scores; ‘Yes’ group: $F(5, 33) = 1.90, p > .05, R^2 = .22$; ‘No’ group: $F(5, 40) = 1.36, p > .05, R^2 = .15$. See Tables 4 and 5 for full results.

Table 4: Regression between variables for sports participation ($n = 39$)

Variable	SIA				CAA			
	<i>B</i>	<i>SE B</i>	β	<i>p</i>	<i>B</i>	<i>SE B</i>	β	<i>p</i>
OEQ	-.136	.084	-.230	.116	-.087	.122	-.177	.481
EMI-2	-.003	.045	-.013	.946	-.099	.065	-.506	.137
REI	-.035	.053	-.105	.513	.125	.076	.455	.110
AIMS	.177	.085	.269	.045	.051	.123	.093	.681
MDQ	.227	.026	.919	.000	-.046	.038	-.222	.243

Note. The above statistics were obtained for the following measures: Obligatory Exercise Questionnaire (OEQ); Exercise-Motivations Inventory-2nd edition (EMI-2); Reasons for Exercise Inventory (REI); Athletic Identity Measurement Scale (AIMS); Muscle Dysmorphia Questionnaire (MDQ); Symptom Insight Assessment (SIA); Criteria Awareness Assessment (CAA).

Table 5: Regression between variables for no sports participation ($n = 46$)

Variable	SIA				CAA			
	<i>B</i>	<i>SE B</i>	β	<i>p</i>	<i>B</i>	<i>SE B</i>	β	<i>p</i>
OEQ	.042	.069	.052	.543	.127	.104	.219	.229
EMI-2	-.035	.023	-.211	.130	.009	.035	.072	.803
REI	.018	.028	.081	.524	.030	.042	.190	.478
AIMS	.120	.057	.169	.042	-.052	.087	-.103	.549
MDQ	.208	.020	.855	.000	-.054	.030	-.309	.079

Note. The above statistics were obtained for the following measures: Obligatory Exercise Questionnaire (OEQ); Exercise-Motivations Inventory-2nd edition (EMI-2); Reasons for Exercise Inventory (REI); Athletic Identity Measurement Scale (AIMS); Muscle Dysmorphia Questionnaire (MDQ); Symptom Insight Assessment (SIA); Criteria Awareness Assessment (CAA).

Discussion

Muscle dysmorphia is a fairly new clinical diagnosis that is primarily shown in adolescent and adult males. The primary symptom shown is that an individual believes that he or she is not sufficiently lean or muscular, even though the individual may already be overly muscular (Pope et al., 1997). To deal with said feelings of inferiority, individuals engage in behaviors to increase muscularity that include frequent weightlifting and strict eating behaviors, often taking away time from social or occupational activities (American Psychiatric Association, 2013; Olivardia, 2001). As the compulsion to attain a certain body shape becomes so central, individuals with muscle dysmorphia may be unwilling to admit that their behaviors are negatively affecting their lives and are unwilling to seek any treatment because it would take away from their time exercising (Grieve et al., 2009; Olivardia et al., 2000).

The purpose of the current study was to assess participant insight to possible diagnostic criteria that they themselves might have and to determine whether they recognize criteria in a case vignette; the predictor variables used were obligation to exercise (OEQ), motivations and reasons for exercise (EMI-2 and REI, respectively), athletic identity (AIMS), and reported behaviors of muscle dysmorphia. It was hypothesized that individuals with high scores for each of the predictor variables would have a low insight score, but would have a high score on recognizing symptoms in the vignette.

Hypothesis One for the study was that individuals with high obligation, motivation, and reason for exercise, athletic identity, and muscle dysmorphia behavior would report low symptom insight and recognition. Even though results did not support

this hypothesis, it is interesting to note that there was a statistically significant increase in symptom insight as athletic identity and muscle dysmorphia behavior increased. Of the six criteria listed, the ones that participants rated the highest were: (1) You are hung-up on the idea that your body is not sufficiently lean or muscular; (2) You avoid situations where your body is exposed to others, or endure such situations with distress or anxiety; and (3) You have feelings about the inadequacy about your body size and musculature that causes distress and impairment in your social, occupational, or other important areas of functioning.

These results are somewhat similar to a prior study conducted by Olivardia, Pope, and Hudson (2000) where 24 men with muscle dysmorphia were interviewed. Out of the 24 interviewed, 10 participants (42%) were said to have accurate insight that their body perception was inaccurate; 12 (50%) had little insight into their preoccupation that they were not muscular enough, and two (8%) had no insight (Olivardia et al., 2000).

Hypothesis Two proposed that, after reading the vignette of an individual exhibiting symptoms of muscle dysmorphia, participants with high obligatory exercise, motivation and reason to exercise, athletic identity, and muscle dysmorphia behavior would have high recognition of symptoms in the described individual. Again, results did not show support for this hypothesis; however, analyses showed a significant decrease in recognizing symptoms in the vignette as participants' behaviors of muscle dysmorphia (MDQ) increased.

These results show some relation to the concept of identification in social comparison theory (Dijkstra et al., 2010). Although participants were still asked to rate the described individual on the same symptoms upon which they rated themselves, the

vignette showed an outward look at behaviors of muscle dysmorphia and the effects said behaviors have on occupational and social environments; there is a chance that participants identified with the described individual and reported low symptomology as a means of defending their own self-image.

There are some possible explanations for the results found. One explanation for the increase in insight to muscle dysmorphia criteria with an increase in athletic identity is because of the behaviors associated with athletic involvement. Participation in athletics already requires a major time commitment, obtaining and maintaining a certain body shape through exercise and diet, and pressure to succeed (Brewer, Van Raalte, & Linder, 1993); therefore, there is the possibility that individuals who identify themselves as athletes may recognize criteria for muscle dysmorphia as part of the requirements for being an athlete instead of mental illness.

An explanation for the findings of the REI could be related to the questionnaire itself. Despite the REI's subscales having a high correlation with their corresponding subscales on the EMI-2, the REI assess the reasons *why* a person exercises; the EMI-2, on the other hand, takes into account the possibility that someone may not exercise and offers the option for participants to choose motivations for *why they should* exercise. As just over half of the participants denied any sport participation, it would not be surprising for scores on this scale to be fairly low.

There are several limitations to the results of this study. First of all, even though the SIA and CAA are based on the established criteria for muscle dysmorphia (American Psychiatric Association, 2013; Olivardia, 2001), they were specifically designed for this study, and therefore have questionable validity. Additionally, the vignette was also

written by the experimenter for this study; therefore it is possible that the vignette does not sufficiently or accurately describe the criteria for muscle dysmorphia in the case described. Second, even though our sample pool allows greater generalizability than prior studies with narrow samples, there is the possibility that, because participants were allowed to complete the survey outside of a research environment for their own convenience, some may have misunderstood the questions (and provided a response that they believed was best). Third, the SIA and CAA were administered at the end of the study; even though there is a decreased likelihood of this affecting the CAA, administering the SIA at the beginning of the study could have made it less likely to be influenced by responses to previous questions. Fourth, even though there was a comparison of results based on current sport participation or not, there was not a comparison between listed sports or whether participating in more than one sport changed symptom insight or recognition.

Future research needs to primarily focus on assessing muscle dysmorphia in many more populations than previous studies; future studies could seek to establish differences in muscle dysmorphia symptoms and behaviors based on ethnicity, sport, and gender. Also, including measures of self-esteem, depression, or anxiety could also be useful in a treatment setting to determine patient overall mood state and gain a greater understanding of psychological well-being for individuals with muscle dysmorphia.

These results suggest that the MDQ and SIA could be utilized in a treatment setting to measure the specific behaviors of muscle dysmorphia and patient insight about their preoccupation with improving their body image. Further, a readiness to change survey (i.e., an assessment of how willing or motivated a person is to change) could also

be administered to patients to determine how willing they are to change their behavior, what therapy might be most effective, and possible treatment outcome. However, more research is needed in establishing cutoff scores on the measurements of muscle dysmorphia to determine which scores warrant a consideration for diagnosis.

To conclude with, even though individuals may not recognize symptoms of muscle dysmorphia in another individual, those with a strong athletic identity or high rates of behaviors appear to have greater insight to any possible symptoms that they themselves might be experiencing.

Appendix A

Demographics Survey

Please fill-out the following information:

What is your age: _____

What is your race/ethnicity: Caucasian African American Hispanic Asian
 American Indian/Alaskan Native Other

What is your education level: High School Graduate College Freshman
 College Sophomore College Junior College Senior College Graduate
 Graduate Student

Do you participate in any sport? : Yes No

If 'Yes,' what sport(s) do you participate in (Please list all)? _____

What is your height in inches? : _____

What is your weight in lbs.: _____

Appendix B

OBLIGATORY EXERCISE QUESTIONNAIRE

Directions:

Listed below are a series of statements about people's exercise habits. Please circle the number that reflects how often you could make the following statements:

1 – NEVER 2 – SOMETIMES 3 – USUALLY 4 – ALWAYS

1. I engage in physical exercise on a daily basis.

1 2 3 4

2. I engage in one/more of the following forms of exercise: walking, running/running or weightlifting.

1 2 3 4

3. I exercise more than three days per week.

1 2 3 4

4. When I don't exercise I feel guilty.

1 2 3 4

5. I sometimes feel like I don't want to exercise, but I go ahead and push myself anyway.

1 2 3 4

6. My best friend likes to exercise.

1 2 3 4

7. When I miss an exercise session, I feel concerned about my body possibly getting out of shape.

1 2 3 4

8. If I have planned to exercise at a particular time and something unexpected comes up (like an old friend comes to visit or I have some work to do that needs immediate attention) I will usually skip my exercise for that day.

1 2 3 4

9. If I miss a planned workout, I attempt to make up for it the next day.
- 1 2 3 4
10. I may miss a day of exercise for no good reason.
- 1 2 3 4
11. Sometimes, I feel a need to exercise twice in one day, even though I may feel a little tired.
- 1 2 3 4
12. If I feel I have overeaten, I will try to make up for it by increasing the amount I exercise.
- 1 2 3 4
13. When I miss a scheduled exercise session I may feel tense, irritable, or depressed.
- 1 2 3 4
14. Sometimes, I find that my mind wanders to thoughts about exercising.
- 1 2 3 4
15. I have had daydreams about exercising.
- 1 2 3 4
16. I keep a record of my exercise performance, such as how long I work out, how far or fast I run.
- 1 2 3 4
17. I have experienced a feeling of euphoria or a “high” during or after an exercise session.
- 1 2 3 4
18. I frequently “push myself to the limits.”
- 1 2 3 4
19. I have exercised when advised against such activity (i.e., by a doctor, friend, etc.)
- 1 2 3 4

20. I will engage in other forms of exercise if I am unable to engage in my usual form of exercise.

1 2 3 4

Appendix C

Exercise Motivations Inventory-2nd edition

On the following pages are a number of statements concerning the reasons people often give when asked why they exercise. *Whether you currently exercise regularly or not*, please read each statement carefully and indicate, by circling the appropriate number, whether or not each statement *is true* for you personally, *or would be true* for you personally if you did exercise. If you do not consider a statement to be true for you at all, circle the '0'. If you think that a statement is very true for you indeed, circle the '5'. If you think that a statement is partly true for you, then circle the '1', '2', '3' or '4', according to how strongly you feel that it reflects why you exercise or might exercise. Remember, we want to know why *you personally* choose to exercise or might choose to exercise, not whether you think the statements are good reasons for *anybody* to exercise.

		Not at all true for me					Very true for me				
	Personally, I exercise (or might exercise)...										
1	To stay slim	1	2	3	4	5					
2	To avoid ill-health	1	2	3	4	5					
3	Because it makes me feel good	1	2	3	4	5					
4	To help me look younger	1	2	3	4	5					
5	To show my worth to others	1	2	3	4	5					
6	To give me space to think	1	2	3	4	5					
7	To have a healthy body	1	2	3	4	5					
8	To build up my strength	1	2	3	4	5					
9	Because I enjoy the feeling of exerting myself	1	2	3	4	5					
10	To spend time with friends	1	2	3	4	5					
11	Because my doctor advised me to exercise	1	2	3	4	5					
12	Because I like trying to win in physical activities	1	2	3	4	5					

Personally, I exercise (or might exercise) ...

13	To stay/become more agile	1	2	3	4	5
14	To give me goals to work towards	1	2	3	4	5
15	To lose weight	1	2	3	4	5
16	To prevent health problems	1	2	3	4	5
17	Because I find exercise invigorating	1	2	3	4	5
18	To have a good body	1	2	3	4	5
19	To compare my abilities with other peoples'	1	2	3	4	5
20	Because it helps to reduce tension	1	2	3	4	5
21	Because I want to maintain good health	1	2	3	4	5
22	To increase my endurance	1	2	3	4	5
23	Because I find exercising satisfying in and of itself	1	2	3	4	5
24	To enjoy the social aspects of exercising	1	2	3	4	5
25	To help prevent an illness that runs in my family	1	2	3	4	5
26	Because I enjoy competing	1	2	3	4	5
27	To maintain flexibility	1	2	3	4	5
28	To give me personal challenges to face	1	2	3	4	5
29	To help control my weight	1	2	3	4	5
30	To avoid heart disease	1	2	3	4	5
31	To recharge my batteries	1	2	3	4	5
32	To improve my appearance	1	2	3	4	5

Personally, I exercise (or might exercise) ...

33	To gain recognition for my accomplishments	1	2	3	4	5
34	To help manage stress	1	2	3	4	5
35	To feel more healthy	1	2	3	4	5
36	To get stronger	1	2	3	4	5
37	For enjoyment of the experience of exercising	1	2	3	4	5
38	To have fun being active with other people	1	2	3	4	5
39	To help recover from an illness/injury	1	2	3	4	5
40	Because I enjoy physical competition	1	2	3	4	5
41	To stay/become flexible	1	2	3	4	5
42	To develop personal skills	1	2	3	4	5
43	Because exercise helps me to burn calories	1	2	3	4	5
44	To look more attractive	1	2	3	4	5
45	To accomplish things that others are incapable of	1	2	3	4	5
46	To release tension	1	2	3	4	5
47	To develop my muscles	1	2	3	4	5
48	Because I feel at my best when exercising	1	2	3	4	5
49	To make new friends	1	2	3	4	5
50	Because I find physical activities fun, especially when competition is involved	1	2	3	4	5

Personally, I exercise (or might exercise) ...

51	To measure myself against personal standards	1	2	3	4	5
----	---	---	---	---	---	---

Appendix D

Reasons for Exercise Inventory

People exercise for a variety of reasons. When people are asked why they exercise, their answers are sometimes based on the reasons they *should* have for exercising. What we want to know are the reasons people *actually* have for exercising. Please respond to the items below as honestly as possible. To what extent is each of the following an important reasons that you have for exercising? Using the scale below, ranging from 1 to 7, in giving your answers.

	Not at All Important (1)	(2)	(3)	Moderately Important (4)	(5)	(6)	Extremely Important (7)	
1. To be slim	1	2	3	4	5	6	7	
2. To alter a specific area on my body	1	2	3	4	5	6	7	
3. To improve my mood	1	2	3	4	5	6	7	
4. To improve my muscle tone	1	2	3	4	5	6	7	
5. To maintain my physical well-being	1	2	3	4	5	6	7	
6. To improve my endurance, stamina	1	2	3	4	5	6	7	
7. To improve my overall body shape	1	2	3	4	5	6	7	
8. To lose weight	1	2	3	4	5	6	7	
9. To be sexually desirable	1	2	3	4	5	6	7	
10. To have fun	1	2	3	4	5	6	7	
11. To improve my strength	1	2	3	4	5	6	7	
12. To maintain my current weight	1	2	3	4	5	6	7	
13. To improve my flexibility, coordination	1	2	3	4	5	6	7	
14. To socialize with friends	1	2	3	4	5	6	7	
15. To be attractive to members of the opposite sex	1	2	3	4	5	6	7	
16. To increase my resistance to illness and disease	1	2	3	4	5	6	7	
17. To increase my energy level	1	2	3	4	5	6	7	
18. To redistribute my weight	1	2	3	4	5	6	7	
19. To meet new people	1	2	3	4	5	6	7	
20. To improve my appearance	1	2	3	4	5	6	7	
21. To improve my overall health	1	2	3	4	5	6	7	
22. To cope with stress, anxiety	1	2	3	4	5	6	7	
23. To cope with sadness, depression	1	2	3	4	5	6	7	
24. To improve my cardiovascular fitness	1	2	3	4	5	6	7	

Appendix E

Athletic Identity Measurement Scale (7-item version)

Instructions: Please circle the number that best reflects the extent to which you agree or disagree with each statement regarding your sport participation.

1. I consider myself an athlete.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

2. I have many goals related to sport.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

3. Most of my friends are athletes.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

4. Sport is the most important part of my life.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

5. I spend more time thinking about sport than anything else.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

6. I feel bad about myself when I do poorly in sport.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

7. I would be very depressed if I were injured and could not compete in sport.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

Appendix F

Muscle Dysmorphia Questionnaire

INSTRUCTIONS: Please respond to each of the following statements. Circle response choice that best describes you.

STRONGLY DISAGREE	SOMEWHAT DISAGREE	SLIGHTLY DISAGREE	SLIGHTLY AGREE	SOMEWHAT AGREE	STRONGLY AGREE
1	2	3	4	5	6

1. When I look at my reflection in the mirror or a window, I feel badly about my body size or shape.

1 2 3 4 5 6

2. Working out causes problems in my job.

1 2 3 4 5 6

3. I eat specific foods at specific times throughout the day in order to gain muscle mass.

1 2 3 4 5 6

4. When I see other muscular men, it makes me feel badly about my body shape or size.

1 2 3 4 5 6

5. I am inclined to continue to work out when I am sick.

1 2 3 4 5 6

6. I am ashamed of my body shape or size.

1 2 3 4 5 6

7. I have difficulty maintaining relationships because of thoughts about my body.

1 2 3 4 5 6

8. I am inclined to continue to work out when I am injured.

1 2 3 4 5 6

9. I have difficulty maintaining relationships because of thoughts of working out.

1 2 3 4 5 6

10. I believe bad things happen in my life when I do not have a specific level of muscularity.

1 2 3 4 5 6

11. Working out causes problems in my romantic relationships.

1 2 3 4 5 6

*12. I believe I am more muscular than others.

1 2 3 4 5 6

13. I feel badly when I do not get to work out.

1 2 3 4 5 6

14. I eat by myself.

1 2 3 4 5 6

15. I am inclined to continue to work out against doctor's orders.

1 2 3 4 5 6

*16. I am inclined to participate in activities that require wearing swimsuits.

1 2 3 4 5 6

17. I believe I am not as muscular as others.

1 2 3 4 5 6

18. I want to be more muscular than I currently am.

1 2 3 4 5 6

19. I think I look better when I have large muscles.

1 2 3 4 5 6

20. Working out causes problems in my friendships.

1 2 3 4 5 6

*21. I am muscular enough.

1 2 3 4 5 6

22. If I could increase my muscle mass, I would.

1 2 3 4 5 6

23. I have difficulty focusing on schoolwork because of thoughts about my body.

1 2 3 4 5 6

24. I am not muscular enough.

1 2 3 4 5 6

25. Others feel that I am way too focused on my body shape or size.

1 2 3 4 5 6

26. I have difficulty focusing on schoolwork because of thoughts of working out.

1 2 3 4 5 6

27. I feel insecure about my body.

1 2 3 4 5 6

28. I use legal or illegal supplements (i.e., creatine or anabolic steroids) to help develop my muscles.

1 2 3 4 5 6

29. I avoid participating in activities that require minimal clothing.

1 2 3 4 5 6

30. The less clothing I wear the more anxious I become.

1 2 3 4 5 6

31. I eat a large amount of protein in order to increase my muscularity.

1 2 3 4 5 6

32. I feel anxious when I deviate from my diet.

1 2 3 4 5 6

33. I believe bad things happen to me when I do not keep my workout schedule.

1 2 3 4 5 6

34. I feel anxious when I miss a workout.

1 2 3 4 5 6

Appendix G

Symptom Insight Assessment

Based on your responses to the previously administered questionnaires, please read each criterion carefully and indicate, by selecting the appropriate number, whether or not each statement is true for you personally...

	Not at all				Very true	
1. You are hung-up on the idea that your body is not sufficiently lean and muscular.	1	2	3	4	5	6
2. Your exercise routine causes distress and impairment in your social, occupational, or other important areas of functioning.	1	2	3	4	5	6
3. You give up important social, occupational, or recreational activities to maintain your workout and diet schedule.	1	2	3	4	5	6
4. You avoid situations where your body is exposed to others, or endure such situations with distress or anxiety.	1	2	3	4	5	6
5. You have feelings of inadequacy about your body size and musculature that cause distress and impairment in your social, occupational, or other important areas of functioning.	1	2	3	4	5	6
6. You will work out, diet, or use performance-enhancing substances despite knowing the adverse physical or psychological effects.	1	2	3	4	5	6

Appendix H

Criteria Awareness Assessment

Jim Ember decided to see a therapist at his wife's insistence after he arrived late to pick up his son from daycare for the third time. Jim's wife stated that he gave his usual excuse: "I was at the gym and just lost track of time." At Jim's first appointment, he was dressed in sweat pants and a T-shirt, both of which looked too big for him. All throughout his appointment, Jim frequently checked his watch; when asked about this behavior, Jim responded, "I do not want to be late for my routine today."

When asked about his exercising, Jim confessed that he had never been very athletic when he was younger. He stated that he started playing league basketball in second grade, but quit after the season ended in his fifth grade year. Jim stated he quit because he was no longer able to play for the Parks and Recreation center or have his father as a coach; the only way he would have been able to keep playing was if he tried out for his middle school team and he said he doubted he would make the cut. Jim indicated that several of his former teammates bullied him after this.

Jim reported that, when he started college, he began to visit the on-campus gym and started doing light weight training and cardio exercises. "I have a family history of heart problems on both sides; I did not want to be a potential victim to that, so I just started trying to keep in good health. Eventually, it became a routine thing," Jim said. He revealed that he also took part in some fitness classes the gym offered; he stated that he made some friends there and actually met his future wife on one occasion.

However, Jim stated, that after a few months, he began to notice how much bigger than him some of the others men at the gym were, and also how much more weight they were able to lift. Jim stated that this reminded him of being bullied when he was younger about "not being good enough" to play for his school's basketball team. Jim said that, after he had this realization, he started to attend the gym no less than four days a week. He reported that he cut out cardiovascular exercises and exclusively hit the weights. Jim stated that, even though he started to notice a change in his muscularity, he still felt that he was still small in comparison to other men in the gym. Jim revealed that he changed his routine to where he woke up early and got to the gym right when it opened, lifted weights until he had class and then came back two hours before the gym closed and stayed until the employees asked him to leave; Jim revealed that there were fewer people at the gym at these times and no one would "see the weakling." He stated that his nightly exercises sometimes caused him to oversleep and he skipped class to make up for lost time. Although this caused some of his grades to drop, Jim indicated that he never made below a C+ in any classes.

Jim reported that he and his wife were married one year after he finished college. Jim reported that he changed his exercise routine to spend time with his wife; he stated that this was a very hard decision, but he did not want his wife to feel neglected. Jim stated that his wife encouraged him to exercise with her for her to get back in shape. Jim revealed that, once she was back to her "pre-pregnancy size," his wife only went for the occasional run. However, Jim stated that he thought that his wife's request for him to

exercise again was her saying that she thought he was not as muscular as he was when they first married. As a result, Jim resumed his previous routine. He stated that he also bought a set of weights for him to use at home so that he would not lose any muscle in between gym visits. Jim revealed that he tore his right bicep two years ago and his left deltoid six months ago; he stated that this was because he missed his protein shake in the morning, but his wife stated that it was because he tried lifting at home just a few hours after getting back from the gym. Jim stated that he takes at least seven aspirin a day so his muscles will not be sore when he gets to the gym.

Jim stated that his diet was now almost exclusively made up of lean protein. He said that he drinks at least five protein shakes a day, avoids sugar and alcohol, and often makes meals just for himself, ignoring whatever his wife has made for their family. Jim mentioned that he considered taking steroids, but avoided them because of his family's cardiac history. Jim said that, if he is in a situation where he thinks his wife will see his body, he waits until she is in another room to get dressed; Jim reported that, as a result, he has not been intimate with his wife in over a year. Jim reported that his exercising has led to trouble before; he indicated that his son has someone else drive him to daycare because Jim leaves for the gym early in the morning, he often arrives late to work, and his family sometimes falls asleep before he gets home. Jim stated that he fears that his wife considers him inferior because he still looks too small. "Sure she says she loves me, but if she met some big, strong guy I am sure she would be gone," Jim said. However, Jim's wife stated that she still loves her husband as much as the day she met him.

Jim is currently employed as a part-time radiology technician at the local hospital, and has been employed ever since he graduated college at age 23. Jim reported that he is satisfied with his job, but his dedication to lifting weights is more important. He also stated that his boss has mentioned promoting him to a full-time radiologist, but has yet to follow through with the decision because he questions Jim's reliability.

Now at age 29, Jim is extremely brawny. He has very broad shoulders, his arms are bulging, and his legs appear lean. Despite standing at a tall 6 foot, 2 inches, Jim weights 245lbs. He does not appear to consider anything wrong with his current approach to exercise and is aversive to seeking help. His first statement when he met with the therapist was, "Ya know, I could be lifting weights right now."

Please read each criterion carefully and indicate, by selecting the appropriate number, whether or not each statement is true that Jim has...

	Not at all				Very true	
	1	2	3	4	5	6
1. A preoccupation with the idea that his body is not sufficiently lean and muscular.						
2. A preoccupation that causes clinically significant distress or impairment in his social, occupational, or other important areas of function.						

	Not at all				Very true	
3. He frequently gives up important social, occupational, or recreational activities because of a compulsive need to maintain workout and diet schedule.	1	2	3	4	5	6
4. He avoids situations where his body is exposed to others, or endures such situations only with marked distress or intense anxiety.	1	2	3	4	5	6
5. He has a preoccupation about the inadequacy of his body size or musculature that causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.	1	2	3	4	5	6
6. He continues to work out, diet, or use performance-enhancing substances despite knowledge of adverse physical or psychological consequences.	1	2	3	4	5	6

Appendix I

Cover Letter-Informed Consent

You are being asked to participate in a survey research project. As such, we would like you to have an understanding of the following:

1. The purpose of this study is to collect information regarding exercise motives and behaviors in college males.
2. You will respond to statements about your attraction to a particular person. Completing all materials should take between 45 minutes an hour.
3. There are no foreseeable risks associated with your participation in this research. However, you are free to discontinue participation in the study at any time without penalty or loss of benefits. You may also freely decline to answer any of the questions asked of you.
4. Your participation in this study does not guarantee any beneficial results. You may receive Study Board credit as a result of your participation.
5. The responses that you provide today will be kept completely anonymous. At no time will your name or any other identifying information be associated with any of the data that you generate today. In addition, the researcher will never identify you personally in any report of this research. Within these restrictions, results of the study will be made available to you upon request. Although your individual responses will not be made public (i.e., they will remain anonymous), your data will be combined with the data of others and submitted for presentation at conventions and/or publication in scholarly journals.
6. If you have questions about the research project, please direct them to Dr. Rick Grieve in GRH 3028. You can contact him by phone Monday through Friday from 8:30 am until 4:30 pm at 270-745-4417 or via e-mail at rick.grieve@wku.edu

THIS PROJECT HAS BEEN REVIEWED AND APPROVED BY THE WESTERN KENTUCKY UNIVERSITY INSTITUTIONAL REVIEW BOARD (IRB) FOR THE PROTECTION OF HUMAN SUBJECTS. ANY QUESTIONS PERTAINING TO YOUR RIGHTS AS A PARTICIPANT, OR ACTIVITY-RELATED INJURY SHOULD BE BROUGHT TO THE ATTENTION OF THE IRB ADMINISTRATOR AT (270) 745-2129.

Appendix J

Debriefing Form

At the beginning of the study, you were told that we were interested in collecting data on exercise factors in college males. While that is a part of what we are examining, we are actually more interested in assessing the relationship between factors of exercise (i.e., behaviors and motivations) with symptoms of muscle dysmorphia. Muscle dysmorphia is a disorder where an individual believes that they are not muscular enough and they employ several different strategies to gain musculature. Even though this disorder can lead to impairments in an individual's life, he/she is so preoccupied with their body image that they are unwilling to admit they have any problems or are willing to change their behaviors. As the disorder is predominately shown in college age males, we limited our sample to that demographic range.

At the beginning of the study, you completed a questionnaire designed to assess how frequently you exercise and your attitudes towards exercise and body image. Our use of this questionnaire is to collect information about your normal exercise patterns and specific beliefs that could influence your exercise regime. The next two questionnaires were used to gather information about your motivations and reasons for exercising. Even though individuals may start exercising for a specific reason (i.e., health related, social aspects, improve strength) they may become so devoted to their routine that they begin to forsake other responsibilities in their life because of a new motivation driving them to exercise. Then you completed an assessment meant to measure your level of athletic identity; even though individuals exercising for athletic reasons normally report more benefits, they have a different set of goals from others that encourage them to exercise and we wanted to assess participants' athletic identity to assess for any confounds. Then you completed the Muscle Dysmorphic Questionnaire. This is an official measure of the symptoms of muscle dysmorphia and we wanted to have an objective assessment of any symptoms that you may exhibit to compare with the other assessments. You were then shown a case study of a patient with each of the criteria necessary for a diagnosis of muscle dysmorphia and asked to rate to what degree you believed he met each of the criteria. The purpose of this was to determine your ability to recognize muscle dysmorphia in a patient and also to increase your awareness about the symptoms and effects they can have. Finally, you were asked to rate yourself on each of the criteria for muscle dysmorphia as a measure of personal insight. It is our belief that individuals who have high scores on the earlier questionnaires will have high degrees of identifying the symptoms in the case study, but low degrees of identifying any symptoms they themselves have.

I apologize for any discomfort that you may have encountered while completing this study and thank you for your participation. The responses that you provide today will be kept completely anonymous. At no time will your name or any other identifying information be associated with any of the data that you generate today. If you have questions about the research project, please direct them to Dr. Rick Grieve in GRH 3028. You can contact him by phone Monday through Friday from 8:30 am until 4:30 pm at 270-745-4417 or via e-mail at rick.grieve@wku.edu

Appendix K

Institutional Review Board Approval



*INSTITUTIONAL REVIEW BOARD OFFICE OF
RESEARCH INTEGRITY*

DATE: February 18, 2014

TO: Austin Lowe, B.S.
FROM: Western Kentucky University (WKU) IRB

PROJECT TITLE: [573494-1] Objective Measures and Insight Assessments of Muscle
Dysmorphia

REFERENCE #: IRB 14-286

SUBMISSION TYPE: New Project

ACTION: APPROVED

APPROVAL DATE: February 18, 2014

REVIEW TYPE: Exempt from Full Board Review

Thank you for your submission of New Project materials for this project. The Western Kentucky University (WKU) IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a project design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This submission has received Exempt from Full Board Review based on the applicable federal regulation.

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding followed by an *implied* consent form. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of the consent document.

Please note that any revision to previously approved materials must be approved by this office prior to initiation. Please use the appropriate revision forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office. Please use the appropriate reporting forms for this procedure. All FDA and sponsor reporting requirements should also be followed.

All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this office.

This project has been determined to be a Minimal Risk project.

Please note that all research records must be retained for a minimum of three years after the completion of the project.

If you have any questions, please contact Paul Mooney at (270) 745-2129 or irb@wku.edu. Please include your project title and reference number in all correspondence with this committee.

1 - Generated on IRBNet

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Western Kentucky University (WKU) IRB's records.

References

- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.
- Baghurst, T., & Kissinger, D. B. (2009). Perspectives on muscle dysmorphia. *International Journal of Men's Health*, 8, 82-89.
- Baird, A. L., & Grieve, F. G. (2006). Exposure to male models in advertisements leads to a decrease in men's body satisfaction. *North American Journal of Psychology*, 8, 115-122.
- Beck, A. T. (1967). *Depression: Clinical, experimental, and theoretical aspects*. New York: Hoeber.
- Brewer, B. W. (1993). Self-identity and specific vulnerability to depressed mood. *Journal of Personality*, 61, 343-364.
- Brewer, B. W., & Cornelius, A. E. (2001). Norms and factorial invariance of the Athletic Identity Measurement Scale. *Academic Athletic Journal*, 15, 103-113.
- Brewer, B. W., Van Raalte, J., & Linder, D. E. (1993). Athletic identity: Hercules' muscles or achilles heel? *International Journal of Sport Psychology*, 24, 237-254.
- Cafri, G., Thompson, J. K., Ricciardelli, L., McCabe, M., Smolak, L., & Yesalis, C. (2005). Pursuit of the muscular ideal: Physical and psychological consequences and putative risk factors. *Clinical Psychology Review*, 25, 215-239.

- Chandler, C. G., Derryberry, W. P., Grieve, F. G., & Pegg, P. O. (2009). Are anxiety and obsessive-compulsive symptoms related to muscle dysmorphia? *International Journal of Men's Health*, 8, 143-154.
- Chaney, M. P. (2008). Muscle Dysmorphia, Self-esteem, and loneliness among gay and bisexual men. *International Journal of Men's Health*, 7, 157-170.
- Chen, S., Snyder, S., & Magner, M. (2010). The effects of sport participation on student-athletes' and non-athlete students' social life and identity. *Journal of Issues in Intercollegiate Athletics*, 3, 176-193.
- Crawford, S., & Eklund, R. C. (1994). Social physique anxiety, reasons for exercise, and attitudes toward exercise settings. *Journal of Sport and Exercise Psychology*, 16, 70-82.
- Davies, R., Smith, D., & Collier, K. (2011). Muscle dysmorphia among current and steroid users. *Journal of Clinical Sport Psychology*, 5, 77-94.
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.
- Dijkstra, P., Gibbons, F., & Buunk, A. P. (2010). Social comparison theory. In: *Social Psychological Foundations of Clinical Psychology* (pp. 195-211). New York, US: Guilford Publications.

- Duncan, L. R., Hall, C. R., Wilson, P. M., & Jenny, O. (2010). Exercise motivation: a cross-sectional analysis examining its relationships with frequency, intensity, and duration of exercise. *International Journal of Behavioral Nutrition and Physical Activity*, 7, 1-9.
- Fournier, G. (2010). *Self-concept*. Retrieved from <http://psychcentral.com/encyclopedia/2009/self-concept/>
- Fox, K. R., & Corbin, C. B. (1989). The physical self-perception profile: development and preliminary validation. *Journal of Sport & Exercise Psychology*, 11, 408-430.
- Grieve, F. G. (2007). A conceptual model of factors contributing to the development of muscle dysmorphia. *Eating Disorders*, 15, 63-89.
- Grieve, F. G., Newton, C. C., Kelley, L., Miller, R. C. J., & Kerr, N. A. (2005). The preferred male body shapes of college men and women. *Individual Differences Research*, 3, 188-192.
- Grieve, F. G., Short, J., Cubberley, R., Derryberry, W. P., Jones, E., Wilson, S., Hanahan, M., & Menser, S., & Cyr, C. (2012). Psychometric properties of a new assessment instrument: The muscle dysmorphia questionnaire. *Unpublished manuscript*.
- Grieve, F. G., Truba, N., & Bowersox, S. (2009). Etiology, assessment, and treatment of muscle dysmorphia. *Journal of Cognitive Psychotherapy: An International Quarterly*, 23, 306-314.

- Groff, D.G., & Zabriskie, R.B. (2006). An exploratory study of athletic identity among elite alpine skiers with physical disabilities: issues of measurement and design. *Journal of Sport Behavior*, 29, 126-141.
- Holmes, T. H., & Rahe, R. H. (1967). The social readjustment rating scale. *Journal of Psychosomatic research*, 11(2), 213-21.
- Jonason, P. K. (2007). An evolutionary psychology perspective on sex differences in exercise behaviors and motivations. *The Journal of Social Psychology*, 147, 5-14.
- Kilpatrick, M., Bartholomew, J. B., & Riemer, H. L. (2003). The measurement of goal orientations in exercise. *Journal of Sport Behavior*, 26, 1-16.
- Kilpatrick, M., Hebert, E., & Bartholomew, J. (2005). College students' motivation for physical activity: Differentiating men's and women's motives for sport participation and exercise. *Journal of American College Health*, 54, 87-94.
- Kyrejto, J. W., Mosewich, A. D., Kowalski, K. C., Mack, D. E., & Crocker, P. R. (2008). Men's and women's drive for muscularity: gender differences and cognitive and behavioral correlates. *International Journal of Sport and Exercise Psychology*, 6, 69-84.
- Leit, R. A., Gray, J. J., & Pope, H. G. (2002). The media's representation of the ideal male body: A cause for muscle dysmorphia. *International Journal of Eating Disorders*, 31, 334-338.
- Lorenzen, L. A., Grieve, F. G., & Thomas, A. (2004). Exposure to muscular male models decreases men's body satisfaction. *Sex Roles*, 51, 743-748.

- Markland, D., & Ingledew, D. K. (1997). The measurement of exercise motives: Factorial validity and invariance across gender of a revised exercise motivations inventory. *British Journal of Health Psychology*, 2, 361-376.
- Mayville, S., Williamson, D., White, M., Netemeyer, R., & Drab, D. (2002). Development of the Muscle Appearance Satisfaction Scale: a self-report measure for the assessment of muscle dysmorphia symptoms. *Assessment*, 9, 351-360.
- McNair, D. M., Lorr, M., & Droppleman, L. F. (1971). *Manual for profile of mood states*. San Diego: Educational and Industrial Service.
- Mosley, P. E. (2009). Bigorexia: Bodybuilding and muscle dysmorphia. *Eating Disorders*, 17, 191-198.
- Nieuwoudt, J. E., Zhou, S., Coutts, R. A., & Booker, R. (2012). Muscle dysmorphia: Current research and potential classification as a disorder. *Psychology of Sport and Exercise*, 13, 569-577.
- Olivardia, R. (2001). Mirror, mirror on the wall, who's the largest of them all? The features and phenomenology of muscle dysmorphia. *Harvard Review of Psychiatry*, 9, 254-259.
- Olivardia, R., Pope, H. G., & Hudson, J. I. (2000). Muscle dysmorphia in male weightlifters: A case-control study. *American Journal of Psychiatry*, 157, 1291-1296.

- Pasman, L., & Thompson, J. K. (1988). Body image and eating disturbance in obligatory runners, obligatory weightlifters, and sedentary individuals. *International Journal of Eating Disorders*, 7, 759-769.
- Pope, H. G. Jr., Gruber, A. J., Choi, P., Olivardia, R., & Phillips, K. A. (1997). Muscle dysmorphia: An underrecognized form of body dysmorphic disorder. *Psychosomatics*, 38, 548-557.
- Pope, H.G. Jr., Katz, D.L., & Hudson, J.L. (1993). Anorexia nervosa and “reverse anorexia” among 108 male bodybuilders. *Comprehensive Psychiatry*, 51, 375-382.
- Rhea, D. J., Lantz, C. D., & Cornelius, A. E. (2004). Development of the Muscle Dysmorphia Inventory (MDI). *Journal of Sports, Medicine, and Physical Fitness*, 44, 428-435.
- Silberstein, L. R., Strigel-Moore, R. H., Timko, C., & Rodin, J. (1988). Behavioral and psychological implications of body dissatisfaction: Do men and women differ? *Sex Roles*, 19, 219-232.